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Rosa Carney, Research Nurse Regional Cardiology Unit, Belfast City Hospital. Fitzsimons Donna, Lecturer and Research Facilitator Centre for Nursing Research, University of Ulster and Belfast City Hospital. Martin Dempster, Lecturer, School of Psychology, Queen's University, Belfast.

Address for correspondence: Dr Donna Fitzsimons, A Floor, Belfast City Hospital, Belfast, BT9 7AB.

Tel: 02890329241 ext 2984 Email: donna.fitzsimons @bch.n-i.nhs.uk

Abstract

Background: Delay time from onset of symptoms of myocardial infarction to seeking medical assistance can have life-threatening consequences. A number of factors have been associated with delay, but there is little evidence regarding the predictive value of these indices. *Aim*: To explore potential predictors of patient delay from onset of symptoms to time medical assistance was sought in a consecutive sample of patients admitted to CCU with acute myocardial infarction. *Methods*: The Cardiac Denial of Impact Scale, Health Locus of Control Scale, Health Value Scale and Pennebaker Inventory of Limbic Languidness were administered to 62 patients between three and six days after admission. *Results*: Attribution of symptoms to heart disease and health locus of control had a significant predictive effect on patients seeking help within 60 minutes, while previous experience of heart disease did not. *Conclusion*: Assisting individuals to recognise the potential for symptoms to have a cardiac origin is an important objective. Interventions should take into account the variety of cognitive and behavioural factors involved in decision making.

Introduction

For well over a decade now thrombolytic therapy has revolutionized the treatment of acute myocardial infarction, essentially dissolving the clot and restoring blood flow to the myocardium. Large clinical trials have demonstrated the effectiveness of thrombolysis in reducing mortality and improving prognosis for these patients [1]. The improvement in these parameters is directly related to the delay in administration of the drug and there has therefore been much interest in factors which prolong patients' decision to seek assistance.

Recent guidelines advocate a delay of no more than 60 minutes between the onset of symptoms and administration of thrombolytic therapy [2]. Many hospitals and health regions have put systems in place to expedite drug administration once the patient has sought medical assistance [3]. Significant delay can also be caused by the type of assistance the patient initially seeks. Studies have found that as many as 50% of patients admitted to hospital with a heart attack call their GP first, rather than an emergency ambulance [4], thus prolonging the time to treatment. However these do not represent the only source of delay. Other research has found that the longest phase of delay is the time taken by individuals to interpret their symptoms as cardiac in origin and decide to seek medical help [5].

Factors influencing delay

There have been several studies which have examined the influence of age on delay time, with a consensus that older people take longer to seek medical assistance than younger individuals [6, 7, 8]. Despite many reports which confirm that women have greater uptake of medical resources than men [7, 9], studies of cardiac illness have

generally found that women have significantly longer delay time than men [6]. Various reasons have been postulated for this anomaly, including popular perception of heart disease as a predominantly male illness. Such beliefs are not supported by evidence, as ischaemic heart disease claims more female lives than breast cancer for example [10].

It is also surprising to find that previous experience of heart disease does not necessarily have a positive influence on delay time. Various sources substantiate that those with known risk factors, or previous heart disease, are no faster in seeking medical assistance than others without such history [8, 11]. The influence of denial on such behaviour has been examined and it has been postulated that previous myocardial infarction may induce post traumatic stress disorder resulting in a situation where individuals may suppress or avoid stimuli that remind him or her of the initial trauma [12]. The concept of denial has been recognised in cardiac patients for many years [13]. It is linked to both positive and negative consequences although certainly its tendency to prolong delay time may endanger the health of the individual [14]. In a study of patients who had a previous myocardial infarction, it was found that fear and denial were frequently experienced during the cardiac emergency [4]. These cognitive processes may influence any future actions, inhibiting or prolonging calls for help.

There is evidence that individuals' behaviour whilst experiencing an acute myocardial infarction is influenced by their prior expectations of what a heart attack would feel like. In a study of 88 patients presenting with a first heart attack, a mismatch between the symptoms experienced and those expected was found in 58% of the sample, and this was associated with delay. The significant proportion of this sample who experienced atypical symptoms, took longer to reach hospital than those whose symptoms were

typical [15]. As a result, the authors concluded that the experience and interpretation of symptoms is an important source of delay for patients experiencing a heart attack.

Symptom perception is related to virtually all activities of daily living, as for instance we eat and sleep in response to feeling hungry and tired respectively. Therefore the process of noticing and reporting symptoms is a key element in the maintenance of homeostasis. Individuals who are not attentive to the severity of their symptoms during a myocardial infarction may attribute the pain to indigestion and therefore delay seeking help. This may have life threatening consequences for the individual [16]. The Pennebaker Inventory of Limbic Languidness (PILL) was devised as a means to detect the individual's disposition to report symptoms. It was found that high scorers on this instrument were more likely to engage in health related behaviours than those with lower scores. It may be proposed that high scoring symptom reporters would have shorter delay times than low scoring symptom reporters. However, disposition to report symptoms using the PILL measure and its impact on delay for cardiac patients has not previously been examined.

A more recent qualitative study of the decision-making processes of a sample of 22 patients admitted to hospital with a second, third or fourth heart attack found that knowledge of symptoms (from previous attack) was not enough to induce prompt action [17]. These authors identified six themes which influenced patients' decision making including:- symptom appraisal, perception of risk, previous experience and psychological factors such as fear and denial. They call for more research on the subject and conclude that interventions to reduce delay should take into account the variety of factors contributing to its occurrence.

Further explanation of the reasons for help-seeking delay after onset of symptoms of acute infarction may be found among the various health behaviour models. Cognition models such as the Health Belief Model [18] and the Protection Motivation Theory [19] suggest that perceptions of severity and susceptibility, among other factors, may be important determinants of health-related behaviours and the Health Belief Model has been proposed as an aid to explaining patient delay in seeking help for symptoms of acute infarction [20]. Considerable attention has also been given to locus of control theory, which seeks to predict health behaviour on the basis of an individual's perception of whether control over specific situations resides with the individual (internal) or others (external). As a result the Health Locus of Control (HLOC) scale was developed to evaluate such perceptions and proposed that these may be predictive of health actions [21]. Other work has found the HLOC scale to be a useful tool in the prediction of compliance with cardiac rehabilitation [22]. There is also evidence to suggest that the value one places on one's health is a significant predictor of health behaviour [23], and Lau et al have developed the Health Value Scale to assess this construct. However, research is required to explore the relevance of these models to the experience of myocardial infarction thereby informing the design of interventions to reduce patient delay time.

It appears from the literature that a number of factors have been postulated as contributing to delay for patients experiencing a myocardial infarction. These studies emanate mainly from United States, although some work has been conducted on the subject in Britain and Germany. There is however a need to bring together a combined

analysis of the factors previously shown to be potentially relevant in predicting delay in this group and to apply these in a European setting.

Aim of the study

The aim of this study was to explore potential predictors of patient delay from onset of symptoms to time of seeking medical assistance in a sample of patients admitted to hospital with an acute myocardial infarction. The dependent variable was delay time and the independent variables were age, gender, method of accessing help, past medical history, symptom attribution, denial, Health Locus of Control, health value and predisposition to report symptoms measured by the Pennebaker Inventory of Limbid Languidness [16].

Study Design

Setting

The study was conducted in a large teaching hospital in Northern Ireland. It is a tertiary referral centre, receiving patients from district hospitals who require invasive diagnostic and treatment facilities.

Design and instruments

A cross-sectional, survey design was used for this study. Instruments included a clinical and sociodemographic questionnaire designed by the research team, comprising 23 questions. In addition to this four measurement scales derived from the literature were used in this study:

- Pennebaker Inventory of Limbic Languidness [16]
- Cardiac Denial of Impact Scale [14]

- Health Locus of Control Scale [21]
- Health Value Scale [23]

Patients

The sample comprised all eligible patients admitted to the Coronary Care Unit of a tertiary referral hospital over a consecutive three month period. All patients with a positive diagnosis of acute myocardial infarction, evidenced by raised troponin or cardiac enzyme levels were studied. Exclusion criteria included those patients who could not read or write, those who developed on-going complications such as heart failure or life- threatening arrhythmias and those who were transferred out of the Unit to receive emergency coronary artery bypass surgery.

Procedure

Patients entered the study on day three of their admission, or later, up to a maximum of day six, if they had complications. Ethical approval for the study was granted by the local university research ethics committee. The study was explained to all eligible patients and they were given the opportunity to ask questions at least 12 hours before written consent was sought. The opportunity to withdraw from the study at any stage without penalty was also stressed to participants. The questionnaires used in the study were self report instruments. They were administered by the researcher in a single ward where each patient had the opportunity to complete the questionnaires in private. The researcher was available afterward to answer questions.

Data Analysis

All data were entered onto SPSS and analysed using standard descriptive statistics, non-parametric tests, and logistic regression analysis.

Results

Sociodemographic and clinical characteristics

There were 62 participants in the study, (mean (sd) age = 57.03 (10.75) years; 88.7% (55/62) male). The medical history of the participants and the symptoms they experienced during their most recent myocardial infarction are displayed in Table 1.

Patients' perceptions and action during event

Participants were asked what they believed was the cause of their symptoms and the modal response was "indigestion" (34%). Of the reasons given for not seeking help immediately, 37% stated that it was because they were unsure of the symptoms. During the onset of these symptoms the minority of participants (27%) were alone; three-quarters called their GP or a member of their family for help and the remainder telephoned for an emergency ambulance. There was no statistically significant association between the method of help seeking and whether or not the person was alone. Neither was there a statistically significant association between previous history of ischaemic heart disease and whether or not symptoms were attributed to heart disease (both $\chi^2 < 0.001$, df = 1, $p > 0.999$).

Delay Time

The summary statistics for the time delay between onset of symptoms and seeking help and for the psychological variables included in the study are shown in Table 2. As the

time delay variable had an extreme positive skew, the median is a more representative measure of central tendency, indicating that patients waited for a median time of 2 hours and 15 minutes from the onset of their symptoms before seeking help. This value is far in excess of the 90 minutes indicated by the BHF. In fact 60% (37/62) of patients waited longer than 90 minutes before seeking help and 63% (39/62) of patients waited longer than 60 minutes.

Factors associated with delay

In order to determine which variables could help to predict delay time, a logistic regression model was constructed using the time delay in seeking help as the dependent variable based on the NSF cut-off point of 60 minutes[2]. The independent variables were:- predisposition to report symptoms, denial, health value, health locus of control, sex, age, whether or not symptoms were attributed to heart pain, whether or not the patients had a previous history of CHD and whether or not the patients telephoned an emergency ambulance to get help. The model fit was statistically significant (χ^2 = 27.302, p = .004), with an R^2 value of 0.38. The information provided by the independent variables increased the classification accuracy on the dependent variable from 64.9% to 84.2%. Significant predictors in the model were health value, predisposition to report symptoms, internal (p=0.06) and chance locus of control and whether or not symptoms were attributed to heart pain (see Table 3). Specifically, the results suggest that the odds of a person who did attribute their symptoms to heart pain taking less than 60 minutes to get help are about 4 times higher than those of a person who did not attribute their symptoms to heart pain. Additionally, as health value scores increase and chance locus of control scores increase and as predisposition to report symptoms scores and

internal locus of control scores decrease, the odds of taking less than 60 minutes to get help also decrease.

Discussion

This study has found that attribution of symptoms to ischaemic heart disease is the strongest predictive factor in patients seeking help within 60 minutes from the onset of symptoms. This supports previous research [24] and has important clinical implications, not just for patients with a history of heart disease, who only accounted for 28% of this sample, but for the general public as well. Most patients in this study initially attributed their symptoms to indigestion, irrespective of whether they had a previous history of heart disease or not. This is an interesting finding which concurs with other studies of this population [17]. It may however deliver an important message in terms of how individuals experiencing a heart attack perceive and evaluate their symptoms. It confirms the importance of lay beliefs which support a “common sense” or lay interpretation of symptoms [26] Thus it appears that an individual experiencing symptoms will initially seek to attribute these to the most innocuous cause. These findings raise the question whether over-the-counter indigestion remedies should carry measured advice to patients, a proportion of whom may in fact be experiencing cardiac symptoms.

Furthermore, it is not only the attribution of symptoms which play an important role in the help-seeking behaviour of these individuals, but also their attribution for control over their health. Our findings suggest that individuals who attribute control for their health to chance factors such as “fate” are more likely to delay longer before seeking help and those who perceive themselves to be responsible for their health are more likely to seek

help quicker. This pattern of results has previously been found in several patient groups and among people with symptoms of AMI in particular [27].

These findings substantiate other research and demonstrate that past history of an acute myocardial infarction does not expedite patients' call for help during a subsequent attack [8]. This counter-intuitive finding has important clinical implications, raising questions about the efficacy of health education interventions and previous cardiac rehabilitation programmes these patients may have taken part in. Various initiatives have been put in place in countries throughout Europe to shorten delay time. Our findings suggest that education of this population is a challenging objective that should take into account the variety of psychological and pathological processes that influence decision making.

Given that current guidelines advocate a delay of no more than 60 minutes from onset of symptoms to thrombolysis it is of some concern that we found a substantial delay of 2 hours and 15 minutes (median) in this study. It would thus seem that it is the persistence of symptoms rather than their severity that encourages patients to seek help. There was a large variance noted in delay time in this study which may be accounted for by the presence of prodromal symptoms, making it difficult to specify precisely the time at which myocardial infarction occurred.

It is unsurprising that we found that a higher predisposition to report symptoms score speeds patient response time but an unexpected result was that higher health value actually delays patient response time. Perhaps it is the case that patients who value their health more are also more likely to ponder various options and seek advice from

those around them, before making a considered judgement about the appropriate action. However, given the concentration of high scores within this group, it is difficult to draw firm conclusions.

Conclusion

Delay in seeking help during a myocardial infarction can have life–threatening consequences. Given the conflicting research which exists in relation to factors contributing to delay, it is imperative that we have stronger evidence on which to base nursing interventions in terms of both primary and secondary prevention. This exploratory study has applied a number of instruments identified by previous research and sought to evaluate their predictive value in terms of patient delay time. Findings from our research suggest that the individual's ability to relate the symptoms they are experiencing to their heart is the strongest predictive factor in patients seeking help within 60 minutes. It is interesting that while locus of control is also of predictive value, previous experience of heart disease is not. Therefore in this study those patients with previous cardiac history, were no quicker in seeking assistance during a heart attack than others without such history.

The psychological factor of attribution appears an important characteristic to address in any attempts to reduce patient delay in seeking help during acute myocardial infarction. Individuals need a clearer understanding of the variability of symptoms of an infarction so that they may be quicker in attributing appropriate symptoms to heart pain. In addition perceptions of control for one's health must be challenged, to ensure that individuals perceive their actions to be one of the most important elements in the potentially life-saving treatment that is required.

Considering the discussions in the literature, it is interesting to note that our findings suggest that denial, sex, age and method of help sought are not related significantly to patient delay time. Due to the small sample size in our study these results are purely exploratory, but they demonstrate the variability of research findings in this area, challenge existing knowledge and underscore the need for more applied, clinical research on the subject.

Table 1: Medical history reported by participants and symptoms experienced by participants at onset of most recent episode of AMI

	N (total = 62)	Percent
CHD	17	27.4
Hypertension	13	21.0
Diabetes	5	8.1
High Cholesterol	12	19.4
Current smoker	17	27.4
Ex-smoker	25	40.3
Symptoms reported:		
Chest tightness	42	67.7
Sweating	35	56.5
Arm pain	21	33.9
Shortness of breath	20	32.3
Nausea	17	27.4
Crushing sensation in chest	16	25.8
Attributed symptoms to heart pain	21	35.6

Table 2: Summary statistics for time delay to help seeking and psychological variables

	Mean	Std.Dev.	Median	IQR	Possible Range
Time delay (mins)	2388.71	10839.55	135	877.50	
Health Value	23.36	4.40	24	8	4 – 36
Denial	24.35	5.55	24	7.25	8 – 40
PILL	10.74	7.61	9	10	0 – 54
Locus of control:					
Internal	26.05	5.52	27	8.25	6 – 36
Powerful others	23.90	6.08	24	10	6 – 36
Chance	17.95	5.41	19	8	6 – 36

Table 3: Significant predictors from logistic regression model (dependent variable = less than 60 minutes to seek help)

	Regression Coefficient (B)	Odds ratio	P
Health value	0.250	1.284	0.039
Predisposition to report symptoms	-0.197	0.821	0.014
Symptoms were attributed to heart pain	1.483	4.404	0.047
Chance locus of control	0.179	1.196	0.037
Internal locus of control	-0.163	0.850	0.060

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